

CIVIL-402

Geomechanics

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Cursus	Sem.	Type
Civil Engineering	MA1, MA3	Obl.
Mechanics		Obl.

Language of teaching	English
Credits	3
Session	Winter
Semester	Fall
Exam	Written
Workload	90h
Weeks	14
Hours	3 weekly
Lecture	2 weekly
Exercises	1 weekly
Number of positions	

Remark

Language: English/French

Summary

Geomechanics deals with understanding, analysing and modelling the mechanical behaviour of geomaterials. The topics go further steps beyond the classical geotechnical engineering and provide students with the fundamental understanding and tools of the behaviour of soils.

Content

- The role of geomechanics in engineering practice
- Strength and deformation (triaxial testing, rheological behaviour, critical state concept)
- Constitutive modelling in geomechanics
- Linear and non-linear elasticity
- Plasticity and failure criteria
- Elastic perfectly plastic models with parameters determination
- Elasto-plastic hardening framework (flow rule, plastic potential and dilatancy)
- Cam-Clay model
- Water in geotechnical engineering (hydro-mechanical coupling in geomechanics; effective stress, consolidation, partial saturation; wetting collapse)
- In-situ tests for parameters determination
- Cyclic loading and liquefaction
- Earth pressures

Keywords

Mechanical behaviour of geomaterial, Constitutive models for soils, shales and rocks, elasto-plasticity, numerical modelling in geomechanics, tunneling and underground structures, nuclear waste disposal, CO2 sequestration, foundation engineering, landslide and slope stability, laboratory and in-situ testing.

Learning Prerequisites**Required courses**

Soil mechanics and groundwater seepage

Learning Outcomes

By the end of the course, the student must be able to:

- Argue the non-linear behaviour of soils, shales and rocks
- Select appropriately the constitutive model for a given geotechnical problem
- Define the methodological approach of using model for an improved and deepened analysis of geotechnical problems
- Propose the geotechnical testing program to define the model parameters

Teaching methods

- Ex cathedra, exercises and homework

Assessment methods

Mid-term written exam: 20% of the final mark

Homework 20% of the final mark

Final exam written 60% of the final mark

Supervision

Office hours	No
Assistants	Yes
Forum	No

Resources

Bibliography

Lectures notes and handouts given during the course